Space Weather Forecast

Issued on Wednesday, 15 February 2023 at 12:32 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further M-flares (R1/R2 Radio Blackouts) likely, with a slight chance of isolated X-flares (R3 Radio Blackout). CME arrival expected on Day 3 (17 Feb), G1/Minor Storms likely with chance G2/Moderate Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate in the last 24 hours, with three low level Moderate-class flares, all originating from a region which is no longer visible on the northwest limb. There are now eight sunspot regions on the visible disc. The most noteworthy region currently is in the northeast. This is now a mature region with some magnetic complexity. The region responsible for the recent flaring is leaving the disc but will still present a flare risk until it is well over the limb. There is also another moderate sized group approaching the west limb, but this has been fairly stable. Most other regions are either small and magnetically simple or relatively stable.

A Coronal Mass Ejection (CME) from near a sunspot region in the southeast is still being assessed but is likely to have an Earth directed component. At this stage the best estimate for an arrival time is during Day 3 (17 Feb).

Solar Wind / Geomagnetic Activity: There have been CME effects of varying strength through this period, with a weak arrival around 14/2200 UTC and either a strengthening or second CME around 15/0430 UTC. Wind speeds were at ambient levels varying between 320-370 km/s. Total Interplanetary Magnetic Field was mostly weak but jumped to moderate around 15/0430 UTC. The north-south component varied weakly but mostly south at first, becoming moderately southward directed from 15/0430 UTC. Geomagnetic activity was Quiet at first, becoming Unsettled to Active with a G1/Minor Storm interval 15/0600-0900 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to remain Moderate, with a slight chance of becoming High with any Strong flares.

Solar Wind / Geomagnetic Activity: Earth is currently experiencing CME effects, which should slowly decline during the next 24 hours or so. A recent CME is still being assessed but appears likely to be Earth directed. At present, the most likely arrival time seems to be sometime during Day 3 (17 Feb). There are no significant coronal holes in the forecast at present, however in addition to any CME effects, it is possible that wind speeds could reach slightly elevated levels at times on Days 3 and 4, but this is low confidence.

Geomagnetic activity is expected to be Unsettled to Active with a declining chance of further G1/Minor Storm intervals during Day 1 (15 Feb). Largely Quiet to Unsettled on Day 2 (16 Feb), before increasing to Active to G1/Minor Storm on Day 3 with a chance of G2/Moderate Storm intervals, slowly declining through Day 4 (18 Feb).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to remain at background levels, but there is a slight chance of exceeding the S1/Minor radiation storm level in response to any significant flares that occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	30	5	60	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	40	40
Very Active	R3 to R5 X	No	10	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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